Unmanned Combat Air Vehicle (UCAV) X-45A Demonstrator System

Overview

The Unmanned Combat Air Vehicle (UCAV) System Demonstration Program is a joint DARPA/Air Force/Boeing effort to demonstrate the technical feasibility for a UCAV system to effectively and affordably prosecute 21st century Suppression of Enemy Air Defenses (SEAD) and strike missions within the emerging global command and control architecture. The Air Force is committed to an aggressive program of exploiting UAV technology for SEAD in the mid-term and movement into a broader range of combat missions depending on technology maturation, affordability, and migration to other forms of warfare. The UCAV System Demonstration Program will provide the information necessary to enable decision-makers to determine whether it is technically and fiscally prudent to continue effects-based development of a UCAV system to perform the SEAD/Strike mission. The knowledge gained from the System Demonstration Program will be a key input to defining the best force mix for the 2010 timeframe. This fact sheet provides additional detail for the summary UCAV System Demonstrator Program Fact Sheet.

X-45A Demonstrator System

The UCAV System Demonstration Program has at its core the successful completion of over 200 demonstration events, the first half of which will be conducted exclusively with the X-45A demonstrator system during demonstration Blocks 1 through 3. These events include analysis, component developments, simulations, ground tests and flight tests. The demonstrator tool set that is being developed to support these demonstrations consists of four principle elements: a sophisticated system simulation; a set of representative air vehicles; a suite of mission control items, and key supportability related components.

Simulation – The UCAV System Integration Lab is a combination high fidelity, diverse participant simulation, and provides the ability to demonstrate up to 20 UCAVs operating in a realistic mission environment or to support system software verification and team training. The UCAV system simulation employs a Boeing developed High Fidelity Environment Model as its core and uses the Boeing Integrated Technology Development Lab.

Air Vehicle – Two X-45A air vehicles have been built, both having the same outer moldline and aeropropulsion integration as initially envisioned for the UCAV operational system. Each vehicle has one working weapons bay, with an avionics pallet located in the other bay. The X-45A is all electric, except for the nose wheel steering and hiking system. The aircraft is powered by a Honeywell F124 engine and is designed to achieve 0.8 M at 40,000 ft with flight duration of approximately 90 minutes. The engine is fed through a serpentine inlet and uses a yaw thrust vectoring system. The program is also supported by a T-33 aircraft that acts as a surrogate UCAV. A Boeing corporate asset on loan to the program, the T-33 has been modified to carry the same avionics suite as the X-45. The X-45A assets will be upgraded after demonstration Block 3 to continue multi-ship demonstrations with the X-45B vehicles.

X-45A Characteristics

Length:	27 ft
Wing Span:	34 ft
Height:	7 ft
Empty Weight:	8,000 lb
Gross Weight:	15,000 lb

Mission Control – The main element of this segment is the mission control console. The mission control console is incorporated into both the UCAV mission control station trailer for local control at the test site, NASA Dryden Flight Research Center, and in the simulation laboratory for distributed control and operator workload experiments. Based on commercial technology, it provides the operator with the decision aids and situation awareness necessary to control up to four air vehicles simultaneously. Another key feature of this segment is the command and control architecture. Using a layered approached modeled after the Internet, the command and control architecture supports the needs of this phase while providing the breath and depth to continue evolution into an operational environment.

X-45A Mission Control Stations

Supportability – The most visible asset of this segment is the vehicle container. Designed to closely replicate the UOS vision, this container was used in November 2000 to transport the first X-45A to the NASA-Dryden test site on a C-17. A high fidelity mass simulator was developed to validate the air vehicle container mating and load process and allow field testing of wing attach and munitions loading concepts. A portable field tester, factory tester, and Prognostic Health Management (PHM) reasoning system also directly support the demonstrations. The container was also used in May 2001 to transport the second X-45A air vehicle to the test site in a C-5.

The two X-45A demonstrators and their container

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